

TECHNOLOGY UTILIZATION

(NASA-SP-5916(03)) ELECTRICAL HAND TOOLS N75-13267  
AND TECHNIQUES: A COMPILATION  
Technology Utilization (NASA) 28 p HC  
\$1.00 CSCL 13I Unclass  
G1/37 04547

ELECTRICAL HAND TOOLS AND TECHNIQUES

A COMPILATION



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

# Foreword

The National Aeronautics and Space Administration and the Atomic Energy Commission have established a Technology Utilization Program for the dissemination of information on technological developments which have potential utility outside the aerospace and nuclear communities. By encouraging multiple application of the results of their research and development, NASA and AEC earn for the public an increased return on the investment in aerospace and nuclear research and development programs.

This publication is part of a series intended to provide such technical information, and presents a collection of innovations developed by NASA, AEC, and their contractors concerning tools, adaptors, fixtures, and shop hints for use in assembling, installing, and servicing electrical components and equipment.

The Compilation is divided into three sections. In section one, a variety of tools considered helpful in assembly and installation procedures is covered. Section two discusses a number of devices found useful in service and maintenance techniques such as straightening, cleaning, and replacing electrical components. The last section is devoted to a collection of shop hints that have assisted technicians in resolving minor problems and in finding quicker and more reliable ways of getting the job done.

Additional technical information on individual devices and techniques can be requested by circling the appropriate number on the Reader Service Card included in this Compilation.

The latest patent information available at the final preparation of this Compilation is presented on the page following the last article in the text. For those innovations on which NASA and AEC have decided not to apply for a patent, a Patent Statement is not included. Potential users of items described herein should consult the cognizant organization for updated patent information at that time.

We appreciate comment by readers and welcome hearing about the relevance and utility of the information in this Compilation.

Jeffrey T. Hamilton, *Director*  
*Technology Utilization Officer*  
*National Aeronautics and Space Administration*

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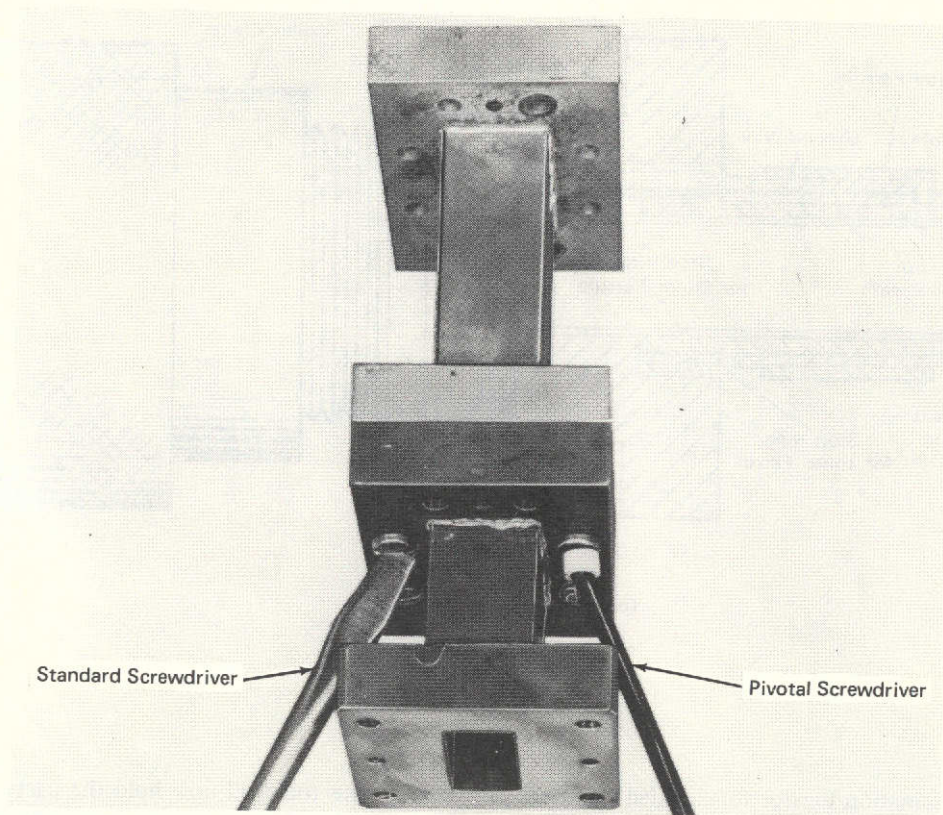
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# Section 1. Assembly and Installation Tools

## PIVOTAL SCREWDRIVER



Assembly and disassembly of waveguide sections having flanges in confined areas, presents problems whenever only common hand tools are available. This pivotal screwdriver is designed to resolve the problem of driving slotted-head fasteners where a high degree of offset is necessary.

The pivotal screwdriver shaft has flat longitudinal sides and two quasi-spherical ends, which have flat sides projecting to points at the centers of the spheroids on the shaft axis. Sockets with integral screwdriver blades are attached at each end of the shaft. Internal flats in the sockets engage the flats on the spheroids.

The combination of shaft and socket functions to transfer the rotational force to the socket by the interaction of the flat sides of the shaft and the flat internal surfaces of the socket, in the same manner as

a socket wrench. The quasi-spherical ends act as universal joints so that the shaft may be oriented off the axis of the screwdriver and yet continue to transfer the rotational force.

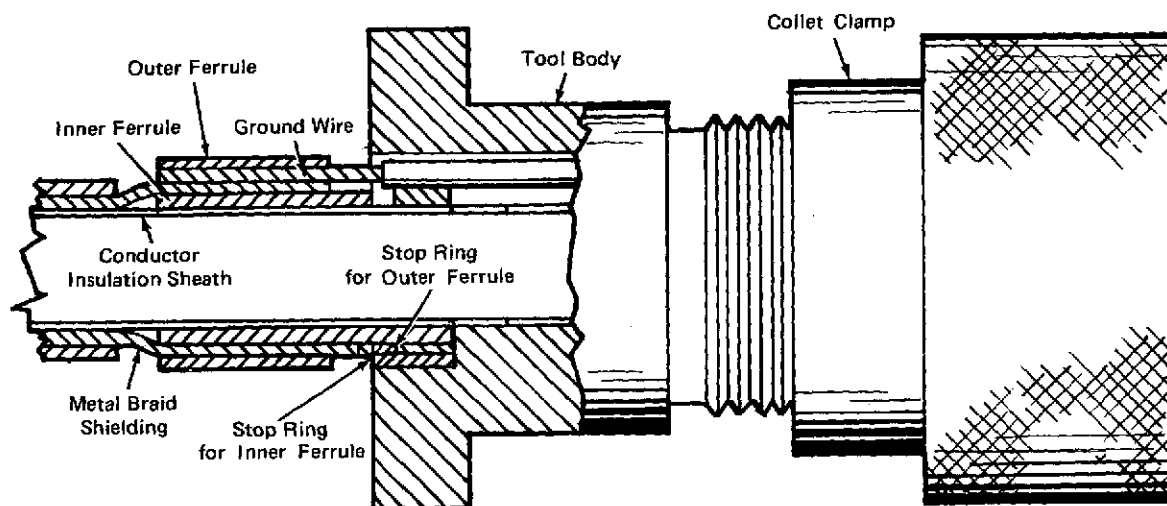
The figure is a photograph of the pivoted screwdriver, illustrating its use in connecting waveguide sections. A standard screwdriver is also shown to illustrate the problem of doing this task with standard tools. The novel pivotal screwdriver easily performs the task of connecting waveguide sections and other tasks where the screws are located in confined areas.

Source: D. L. Mullen and C. T. Stelzried of

Caltech/JPL  
under contract to  
NASA Pasadena Office  
(NPO-11007)

*Circle 1 on Reader Service Card.*

## TERMINATION LOCATOR TOOL FOR SHIELDED CABLES: A CONCEPT



Termination Locator and Cable

A new termination locator for shielded electrical cables assures relative positioning of inner and outer ferrules within specified tolerances during the crimping of the outer ferrule. A special feature of the concept is the flexible stop rings, which are not over 0.0254 cm (0.010 in.) thick and are of the proper diameter to locate the ferrules.

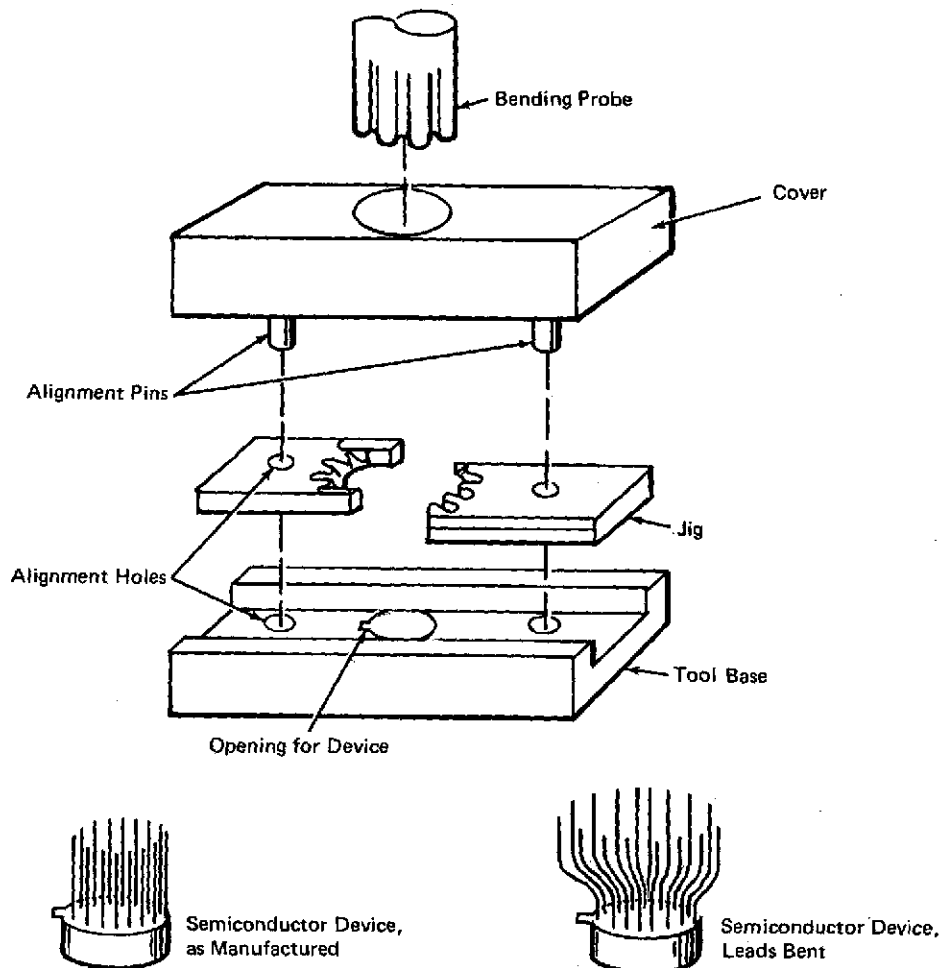
With the ferrules partially assembled, the tool is placed over the conductors and ground wire. As the ferrules are pushed back onto the shield, they are located in their proper position relative to each other, and the clearance to the outer cover is set. Proper contact on the stops is observed through the cutaway section of the outer stop ring. With these locations properly positioned, the tool is locked onto the cable by tightening the rubber collet cable

clamp. The tool will now hold the parts, including the ground wire, in proper position while the outer ferrule is crimped. The thin teflon stop will deflect as the ferrule is crimped, and both stops are sufficiently thin that they can be removed after the outer ferrule is crimped. Preliminary trials with the first prototype indicate that this new tool will save at least 1/3 of the cost of making these termination assemblies.

Source: L. P. David of  
Rockwell International Corp.  
under contract to  
Johnson Space Center  
(MSC-15736)

*No further documentation is available.*

## INTEGRATED CIRCUIT LEAD FORMING TOOL



A new lead forming tool can bend each lead of a transistor, diode, or other integrated circuit device without damaging the glass header seal. The tool holds the circuit device firmly, relieves strain on the glass header, and permits simultaneous forming of all the leads.

As shown in the figure, an integrated circuit or semiconductor device is placed into the opening provided on the base of the tool, with the tab aligned in the slot. Both sides of the jig are placed in the track of the base and positioned above the alignment holes. The cover is placed on top of the jig, with the alignment pins positioning all the pieces. The bending probe is then inserted into the opening in the cover, with a slight rotational pressure; the leads on the

device are thus bent into the desired shape. By lifting up the cover and sliding the two halves of the jig to the sides, the formed device can be lifted from the base. The parts of the jig in the diagram are shaped to bend the leads so as to form the long plug diameter required for printed circuit boards, but other types of bends may be provided by suitably formed jigs.

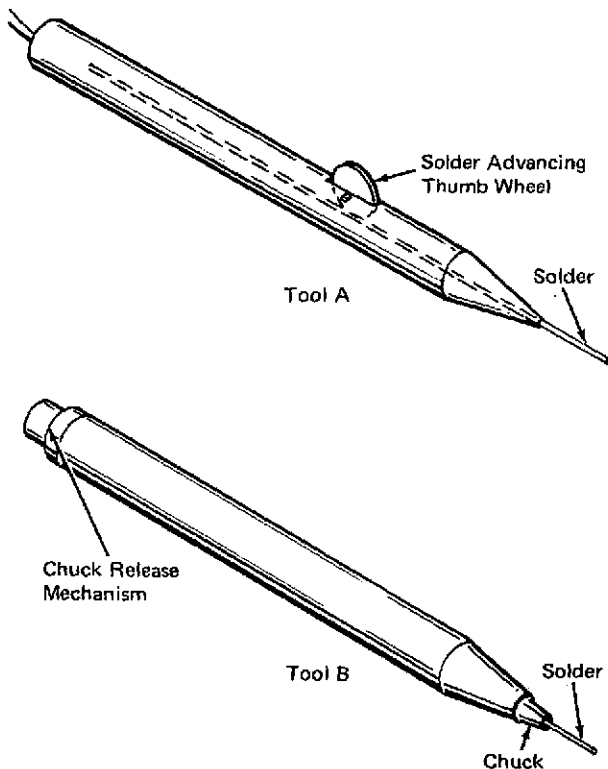
Source: S. F. Kirmse of  
Lockheed Missiles & Space Co.  
under contract to  
Ames Research Center  
(ARC-10184)

*No further documentation is available.*

## SOLDER APPLICATION TOOLS

To solder correctly, it is necessary to have complete control of the soldering iron and the solder. The solder must be put into the exactly right position and in the right quantity, so that a correct joint can be made. Solder is customarily hand-held, with a convenient length straightened, and it is fed as necessary to the joint. It is particularly difficult to feed the solder where obstructions force the solderer to extend a length of solder a few inches from his fingers. The thin diameter and the very soft nature of the solder cause it to bend with the slightest side pressure.

Standard production equipment is available with a reel of solder attached to the soldering iron. One-handed operation is possible; however, the control so necessary in the proper placement of the solder is missing. The high cost of these units is also a deterrent to their general use.



Hand-held devices such as those shown in the accompanying figure control the placement and quantity of solder at the joint. Tool A is a hollow cylinder similar to a pen or pencil with the center hole just slightly larger than the size of the solder to be used. A wheel located at a position convenient for thumb rotation protrudes through a slot in the cylinder. The wheel is fastened to the cylinder by a transverse pin, either cemented or peened in place. The exact location of this wheel in relation to the solder is very critical. Enough pressure must be exerted on the solder to have it feed easily, but excessive pressure will not allow solder movement. A clearance between the thumb wheel and pin provides the needed control. At the end of the tool, a bent and flattened rod is force-fitted into the through-center hole. This rod can be used as an aid to the soldering operation. The shape can be as shown or altered for specific use. With proper sizing, a family of rods can be used as required.

Tool B is, again, a hollow cylinder, but the feed mechanism is of the chuck type. To feed solder, the end is pushed to release the chuck hold on the solder. When the tool is pointed downwards, releasing the chuck will feed solder. A decided advantage for this type tool is that solders of different diameters can be used.

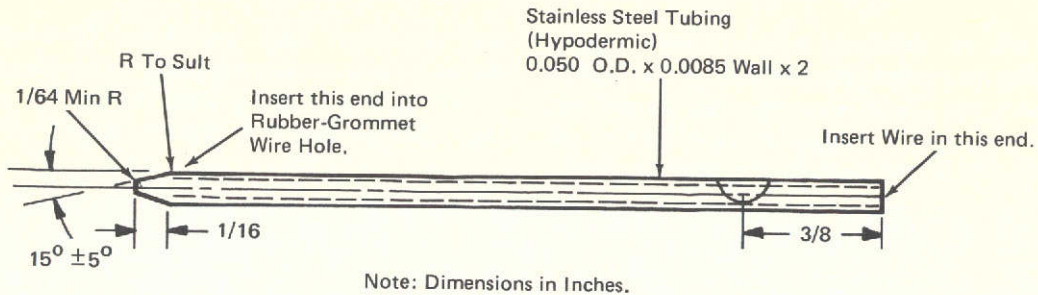
The solder is loaded into both tools from the pointed end. A straightened length of solder, somewhat longer than the tool length, is pushed to the end of the tool. On Tool A, the thumb wheel has to be rotated in a reverse direction and on Tool B the chuck has to be in the released position. Use of the tools is somewhat at the discretion of the solderer and the length of solder projecting from the end of the tool can vary, with an "around the corner" bend possible.

Source: J. E. Morrison of  
The Boeing Company  
under contract to  
Kennedy Space Center  
(KSC-10720)

*No further documentation is available.*



## WIRE INSERTION TOOL FOR FRONT-LOADING CONNECTORS



Wire Insertion Tool

A new tool facilitates insertion of wires into front loading, rear release, miniature electrical connectors without damaging the silicone rubber grommet. Other assembly techniques frequently introduce cracks in the grommet surface adjacent to the wire holes.

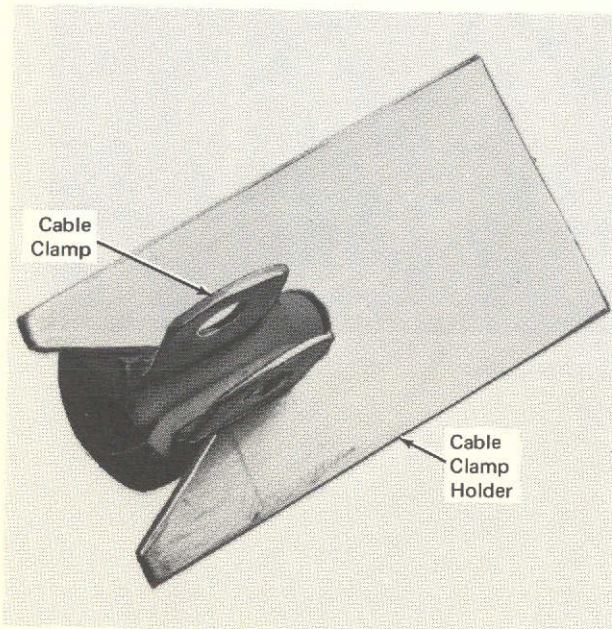
The tool, shown in the illustration, consists of a suitable length of stainless steel hypodermic tubing with a rounded point on one end. To use the tool, insert the rounded end into the rubber-grommet wire hole. Then insert the wire into the open end of the

tool. Pushing the wire passes the tool and wire through the grommet without splitting the silicone rubber surface.

Source: E. J. Casey and M. E. Ingles of  
Rockwell International Corp.  
under contract to  
Johnson Space Center  
(MSC-15661)

*No further documentation is available.*

## CABLE CLAMP HOLDER CLIPS FOR ASSEMBLY IN RESTRICTED AREAS



Various types of toggle tools are used to temporarily compress cable clamps on wire bundles while the assembler installs and secures the clamp through-bolt. Modern systems are being developed with increased packaging density that results in decreased assembly access. In this limited situation, conventional toggle tools cannot be used.

This innovation (see figure) solves the problem neatly by holding the clamp in a semi-closed condition while the assembler, with both hands free, easily inserts and secures the through-bolt. When the bolt is secured, the clip slips easily from the clamp.

Source: W. L. Hinze of  
Rockwell International Corp.  
under contract to  
Johnson Space Center  
(MSC-17118)

*Circle 2 on Reader Service Card.*



## HAND TOOL REMOVES CABLE SHIELD

This tool was developed to trim excess braided shielding before crimping terminal ferrules on shielded cable assemblies. The tool has opposing cutters that shear the braid against an inner sleeve when the tool is rotated. The sleeve protects the inner insulation

and conductors from the blades. Interchangeable sleeves with a positioning gauge adapt the tool for use on different sized cables, and several insertion sleeves are provided to position the inner ferrule.

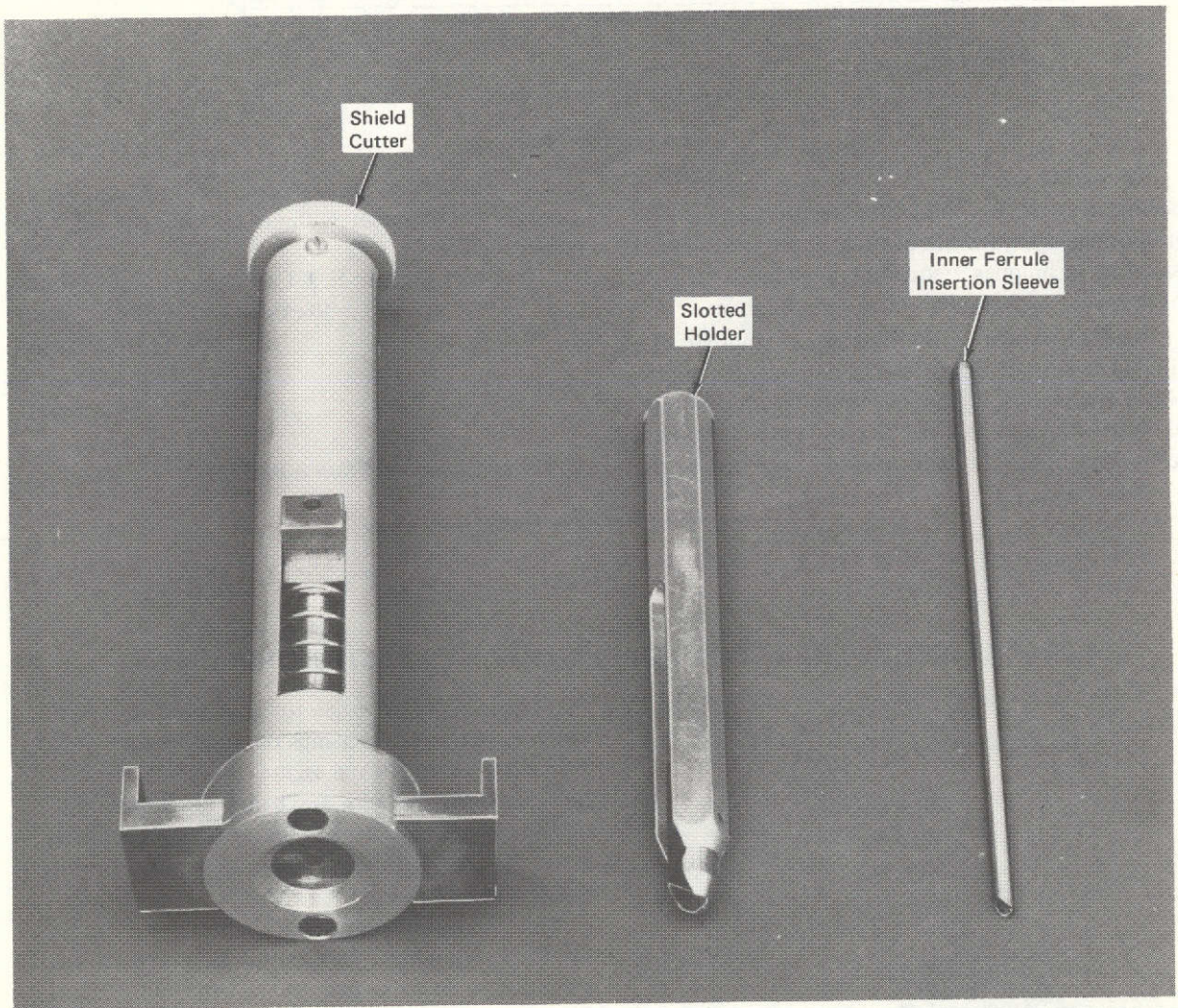


Figure 1. Cutting Tool and Accessories



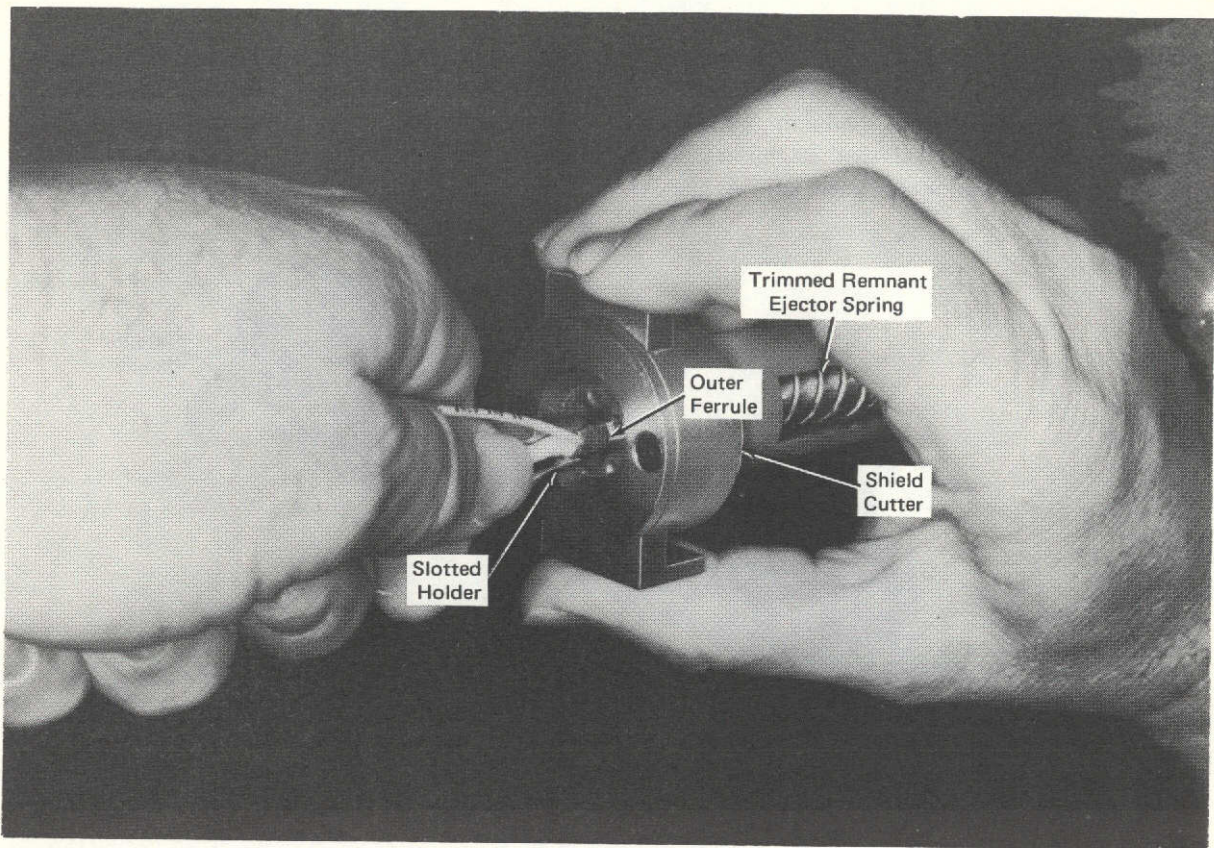


Figure 2. Cutting Tool In Use

After a sufficient length of the outer insulation is removed, the inner ferrule is positioned on the inner conductor, using the appropriate insertion sleeve. The proper-size cutter stop sleeve is installed in the tool, and a special gauging tool sets the stop sleeve in proper relation to the cutters. The braided shield is slipped over the cutter stop sleeve, and the outer ferrule is placed over the braided shield and against the cutter, using the slotted holder. The cutter slides are depressed as the tool is rotated, and the shield is

severed evenly with the end of the outer ferrule. The cable-end assembly is now ready for the ferrule crimping operation.

Source: L. P. David of  
Rockwell International Corp.  
under contract to  
Marshall Space Flight Center  
(MFS-16197)

Circle 3 on Reader Service Card.



## INSULATION AND SHIELD REMOVING TOOL

This removal tool (see Figure 1) is capable of cutting the sleeve [(1) in Figure 2] above a shielded cable, the shield itself (2), and the insulation (3), without damaging the center conductor (4). The tool is equipped with a dial that establishes the depth of blade penetration for each cut. A blade

In operation, the cable to be cut is inserted in the V-notch in the frame of the tool. The cutting edge is brought against the cable to a position fixed by the depth-of-cut setting chosen. The tool is then rotated around the cable to achieve the desired cut, and the blade is retracted and the cable removed.

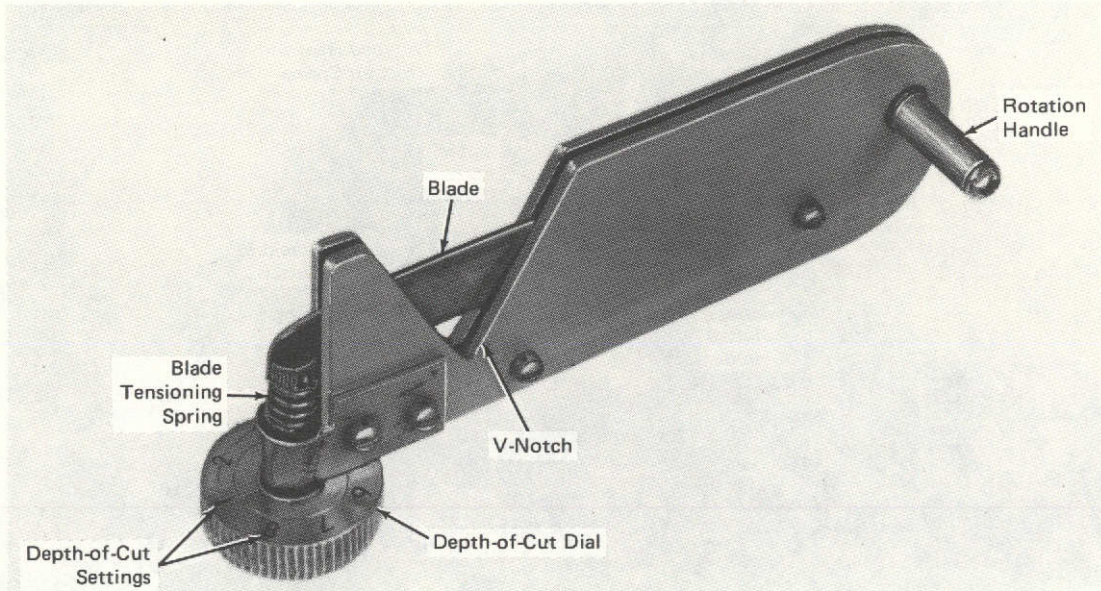


Figure 1. Insulation and Shield Removing Tool

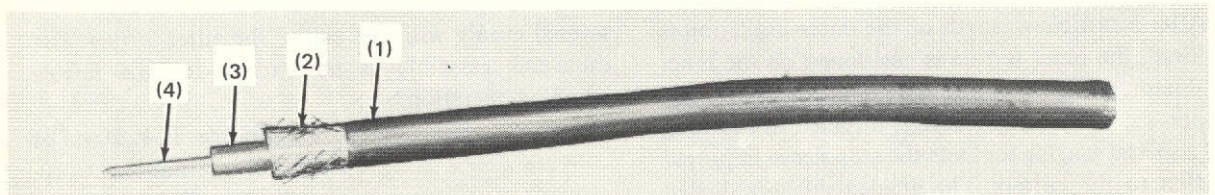


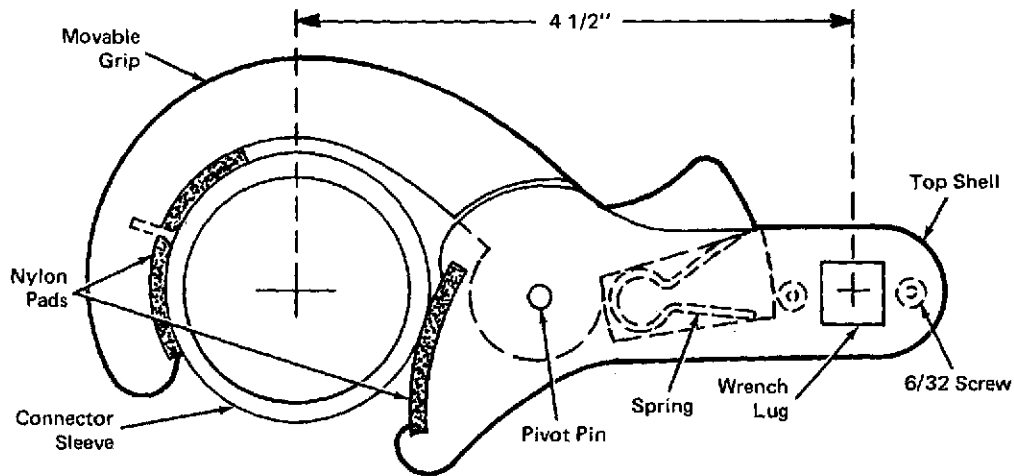
Figure 2. Actual Insulation and Shielding Cut by the Tool

tensioning spring limits blade penetration and guards against overcutting. The adjustable feature permits the tool to be used on most wire sizes by predetermining the proper dial setting with a section of test wire.

Source: T. C. Marshall and G. O. Bohot of  
Rockwell International Corp.  
under contract to  
Johnson Space Center  
(MSC-15045)

*No further documentation is available.*

## TORQUE WRENCH ADAPTER FOR CABLE-CONNECTOR ENGAGING RING



Adapter Torque Wrench

When electrical cables employing connectors with threaded sleeves are installed, the sleeves must be tightened to be weather resistant but not so tight as to damage the connector assembly. Application of incorrect torque frequently results in either damaged connectors or moisture penetration and electrical failure. The purpose of this device is to provide a means for safely applying the correct torque.

Previously available wrenches damaged the connector sleeve and adjacent molded section of the cable termination, and did not permit measurement of the applied torque. This device has been used successfully in close quarters where several connectors were installed. The use of a torque wrench adapter

can be expected to greatly increase the service life of the connectors, thereby reducing replacement costs.

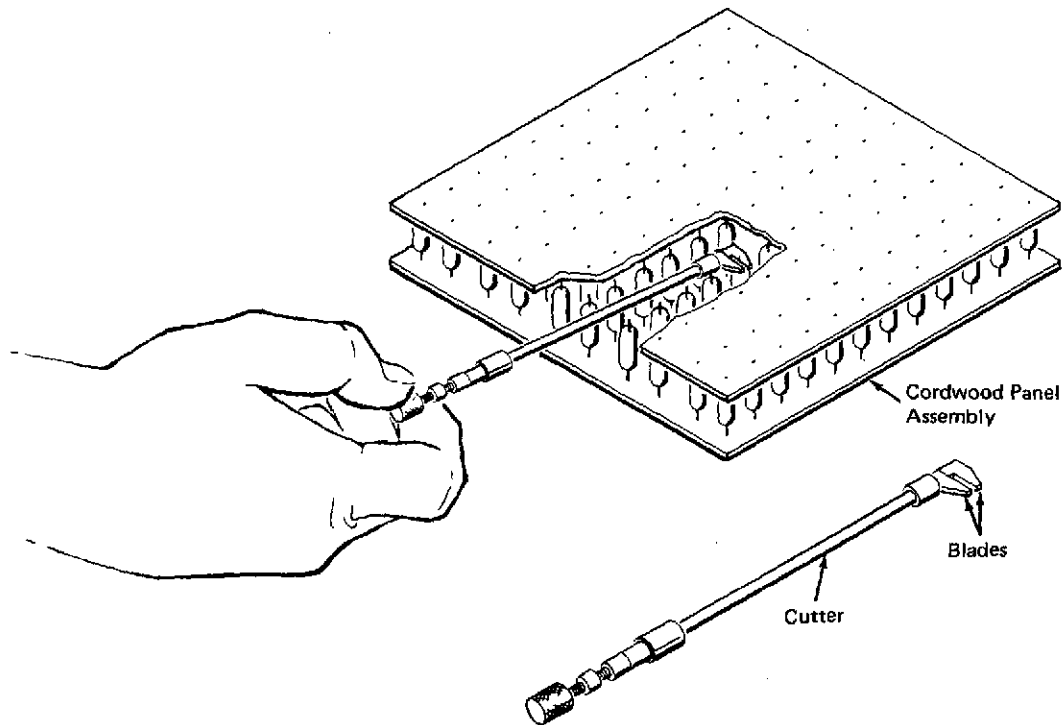
Construction of the adapter is shown in the attached drawing. This device fits over the threaded sleeve of the connector and will not damage the adjacent molded section. In addition, the adapter has two nylon pads at the contact points to prevent any surface damage to the connector sleeve.

Source: W. H. Dillard of  
Bendix Corp.  
under contract to  
Kennedy Space Center  
(KSC-10621)

*No further documentation is available.*

## Section 2. Repair and Maintenance Tools

### REPLACING ELECTRONIC COMPONENTS IN A CORDWOOD PANEL ASSEMBLY



Whenever it is necessary to replace a defective component inside of a cordwood panel assembly, several good components are removed to provide clear access to the defective item. This is not only an expensive and time-consuming method, but it also adds potential failures to the panel by the addition of new components other than the failed item. A new small cutter was designed to be slipped between the rows of components to cut the defective component leads. After the leads are cut, the defective component falls out and the stub leads are removed from the outside by unsoldering. The bottom lead on the new component is then measured and cut to the proper length. The top lead is formed to facilitate the pass through the panel

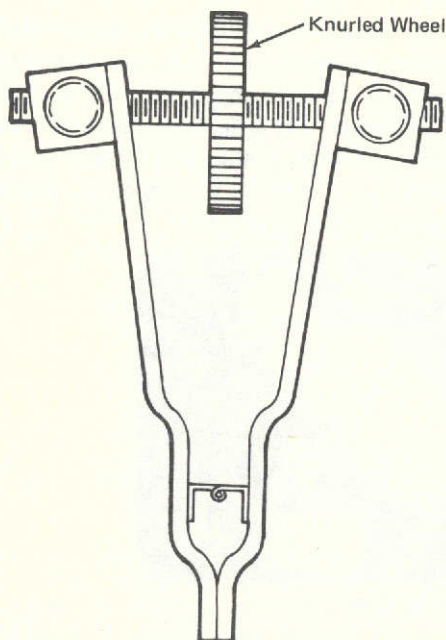
eyelet. As the top lead is pulled up through the eyelet the bottom lead is aligned with the lower eyelet of the panel. The component is then centered by the proper protrusion of the bottom lead. The bottom lead is soldered; then the top lead is cut to proper length and soldered, completing the component replacement.

Source: B. A. Bienvenue of  
IBM Corp.  
under contract to  
Marshall Space Flight Center  
(MFS-21918)

*Circle 4 on Reader Service Card.*



### CONNECTOR SEPARATING TOOL



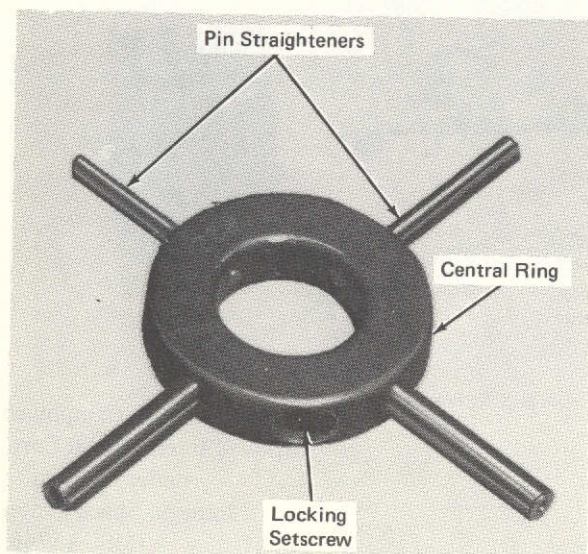
During testing and during disassembly of test set-ups, it is frequently necessary to separate plug and receptacle components of multipin connectors. Where space is very limited, it is often impossible to get a firm grip on the plug and receptacle bodies, and working them apart by pulling on the cables is an unacceptable practice.

This tool is designed to separate 51-, 37-, 25-, and 21-pin connectors used in aerospace ground-support equipment. The small (or nib) end of the tool is inserted between the plug and receptacle bodies, and the knurled wheel of the jackscrew is turned to force the upper (or handle) ends of the tool together. This forces the nib ends apart and separates the plug and receptacle sections of the connector.

Source: G. C. Dietz  
Goddard Space Flight Center  
(GSC-11029)

*No further documentation is available.*

### FOUR-WAY TOOL FOR STRAIGHTENING CONNECTOR PINS



This four-way, pin straightening tool offers advantages over the conventional single barrel tool. Four different straightening barrels are mounted on a central ring and held in place by locking setscrews. This results in what is essentially a T-handle tool that will accommodate four different sizes of connector pins. Each straightening barrel has a superfinished internal finish to permit safe use on gold plated contacts. After long use, individual straighteners can be replaced.

Source: M. A. Vanarse and R. G. Bird of  
Rockwell International Corp.  
under contract to  
Johnson Space Center  
(MSC-15764)

*No further documentation is available.*



## POTTING TECHNIQUE CENTERS CABLE IN MOLD

In this technique, premolded centering strips (Figure 1) are used to maintain proper conductor positioning during a potting operation. The potting operation is a two step process in which the initial mold adds the three centering strips. Room temperature vulcanizing (RTV) potting compound is used in both steps of the process.

In the second step (Figure 2), encapsulation of a T adapter is accomplished as the individual cable components are held in position by the centering strips of Figure 1. The final potting mold consists of the main mold with fill relief holes for complete encapsulation by the RTV compound, plus a close-off member at each end.

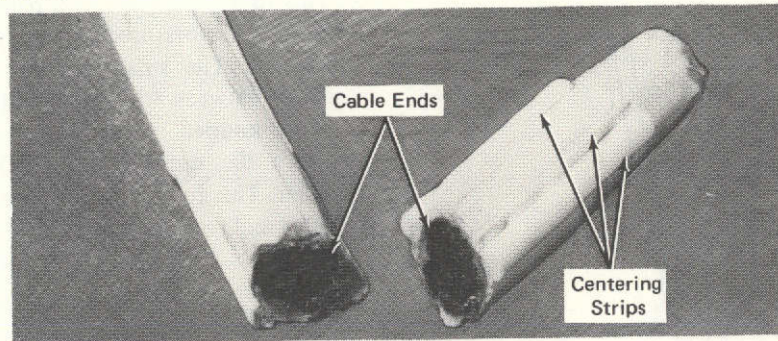


Figure 1. Premolded Centering Strips

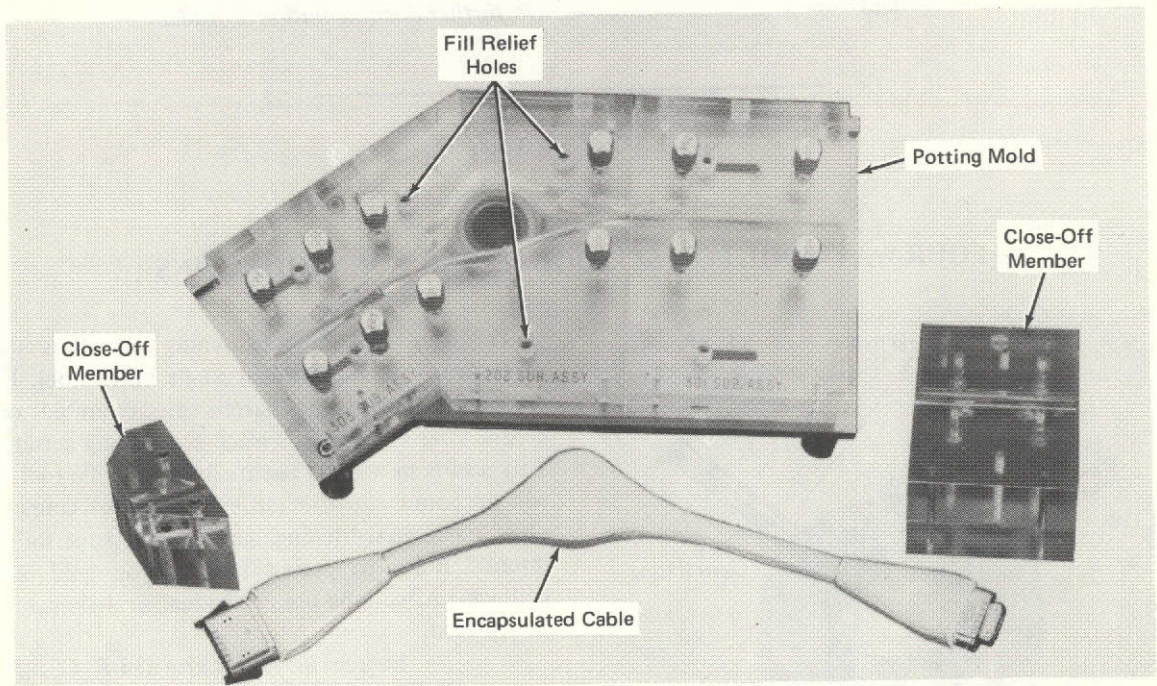
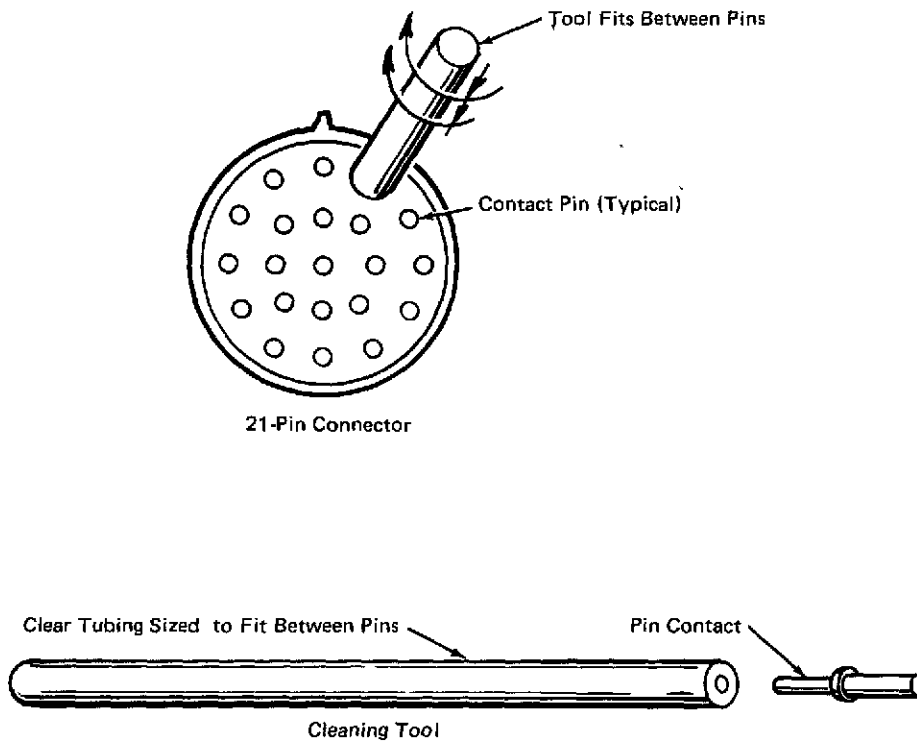


Figure 2. Encapsulated Cable and Assembly

Source: A. Z. Campoy of  
Rockwell International Corp.  
under contract to  
Johnson Space Center  
(MSC-15746)

*No further documentation is available.*

## CONNECTOR PIN CONTACT CLEANING TOOL



Previously, pin contact surfaces were cleaned with a heat-shrinkable tubing, lined with an abrasive cloth. The tubing was heat shrunk to a snug fit around the pin and then worked back and forth to effect a scouring action. This cleaning device was difficult to make properly, and the process was time consuming.

A new cleaning tool has been designed to fit snugly over each pin contact and clean all adjacent contacts. The tool consists of a properly sized clear plastic tube that is filled with a blend of 1 to 2 parts aluminum oxide and resin mixed in room temperature vulcanizing (RTV) potting compound. A proper-

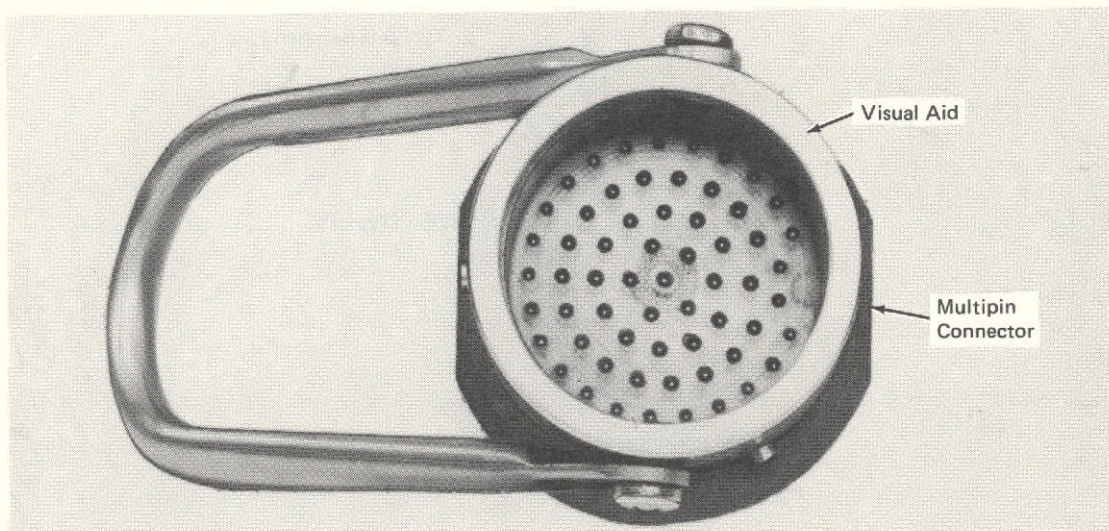
diameter center hole is established in the compound by conventional means. This end of the tool is slipped over a pin contact and rotated back and forth until the contact is clean. When the cleaning compound has been exhausted, the used portion of the tool is cut off and the process is repeated.

Source: W. L. Quigley of  
Grumman Aerospace Corp.  
under contract to  
Goddard Space Flight Center  
(GSC-11411)

*No further documentation is available.*



## VISUAL AID ASSURES PIN ALIGNMENT IN MULTIPIN CONNECTORS



In the mating of multipin connectors, misalignment, excessive protrusion or recession, or merely bent pins can result in serious damage to the connectors. This visual aid (see figure) permits the technician to make an instant and accurate assessment of the condition of the connector pins.

The holes in the plexiglass, visual-aid, pin straightener are tapered. The holes are larger at the bottom, where the pins first enter the tool as it is applied, and form a snug fit at the top. Thus, as the tool is applied, a smooth straightening action is exerted on all pins. Additionally, when fully seated, the visual

aid quickly identifies any pins that are longer or shorter than standard depth, so that corrective action can be taken.

The plexiglass alignment fixture is constructed so that the ends of all straightened pins should be flush with the top of the holes when the fixture is firmly in place.

Source: D. M. Gilliam and J. A. Foster  
Kennedy Space Center  
(KSC-10688)

*Circle 5 on Reader Service Card.*

## TORQUE WRENCH FOR ELECTRICAL CONNECTOR ADAPTER SLEEVE

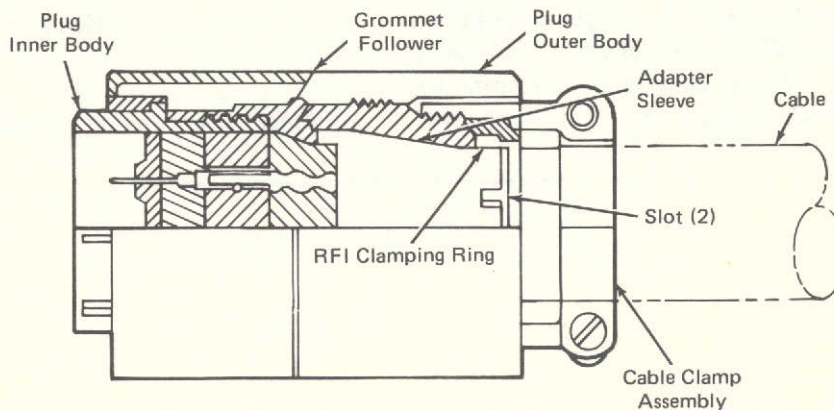


Figure 1. Cable Clamp Assembly



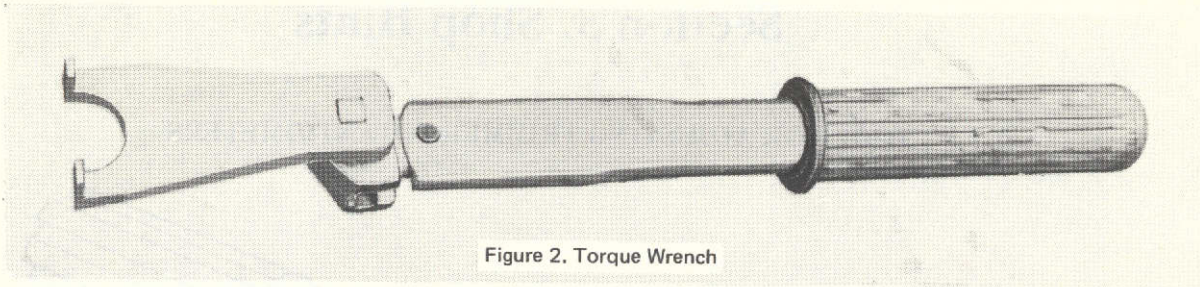


Figure 2. Torque Wrench

Front-loading, electrical cable connectors are difficult to repair because of the limited access to the back of the connector. The connector adapter sleeve (see Figure 1) is installed by the connector manufacturer and is not normally removed. If a defective pin or socket connection is found after cable assembly, it has, in the past, been necessary to rewire the assembly. However, with this new tool, the pin or socket can be repaired without wire replacement.

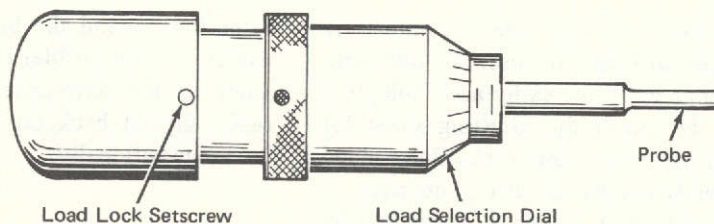
To use the new tool to remove the adapter sleeve after cable assembly, the cable clamp assembly is disengaged and slid out of the way. The spanner wrench (see Figure 2) is placed around the cable.

The outer dimension across the spanner lugs guides into the outer body opening and centers the wrench. The inside edges of the lugs are then engaged in the slots in the adapter sleeve. The ratchet type torque wrench permits easy removal and properly torqued reassembly of the adapter.

Source: G. A. Huffman and R. Carrillo of Rockwell International Corp. under contract to Johnson Space Center (MSC-17577)

*No further documentation is available.*

### ADJUSTABLE FORCE PROBE



In testing the seating of taper contact pins in patch-type distribution panels, the tool formerly used employed an ordinary compression spring in connection with a buzzer to indicate proper loading. The method was subjective and placed a high premium on operator skill.

This adjustable force probe is designed for mass testing of specified forces, such as disengagement loads on pressure fits or activation forces on switches. Specifically, the device is used to test taper contact-pin seating in patch distribution boards by applying a preset load to the pins in the direction of extraction. An unskilled operator, after setting the

selected test load, may check a large number of test points without reading or recording data. After setting and locking the desired load, the tool is pressed by hand onto the test point. By increasing the pressure, the probe collapses at the preset load point.

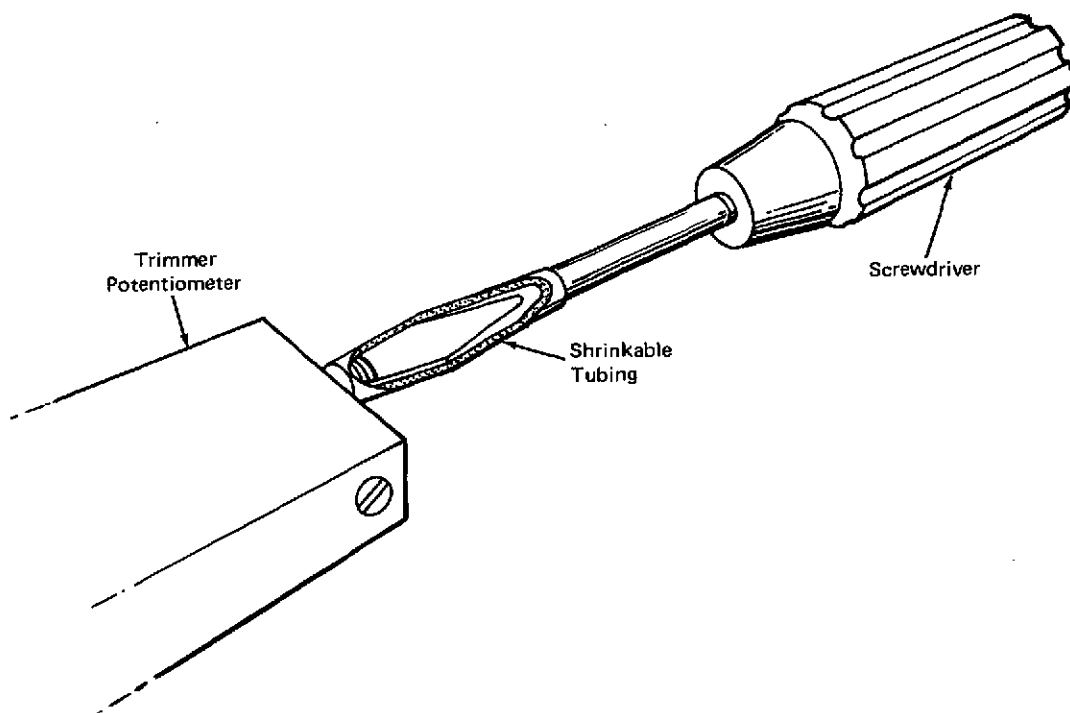
Source: W. E. Kasparek, B. B. Swords, and W. K. Rosinski  
Marshall Space Flight Center (MFS-20760)

*Circle 6 on Reader Service Card.*



## Section 3. Shop Hints

### TOOL FOR ADJUSTING TRIMMER POTENTIOMETERS



Presently available tools for adjusting miniature potentiometers are difficult to use. If the card-mounted potentiometer is not easily accessible, it is difficult to keep the tool in the adjusting screw slot while attempting to rotate the tool. One-handed manipulation is nearly impossible in close quarters.

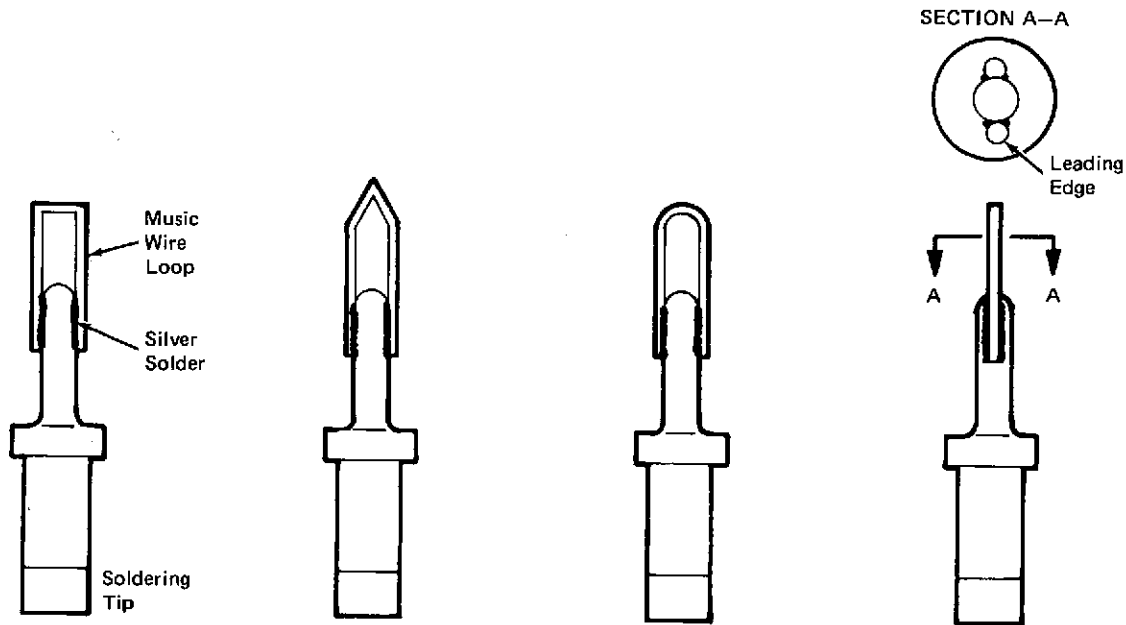
This tool consists of a standard, commercially available screwdriver which has been modified by the addition of heat-shrinkable tubing to its blade tip. Under controlled shrinking, the tubing will snugly grip the screwdriver shaft and blade tip. A slight

extension beyond the blade tip, achieves a "socket" like effect that enables it to lightly grip the adjusting screw as the screwdriver is rotated. The tubing is easily slipped back on the screwdriver shaft when used conventionally.

Source: J. Brinda, Jr. of  
Westinghouse Corp.  
under contract to  
Space Nuclear Systems Office  
(NUC-10129)

*Circle 7 on Reader Service Card.*

## HOT KNIFE TECHNIQUE FOR REMOVING POTTING COMPOUNDS



Hot Knife with Various Shaped Loops

It is frequently necessary to remove a partial covering of potting compound from an encapsulated circuit component or components while avoiding disturbance to other components within an encapsulated circuit. Some areas are inaccessible to machine-cutting, and a sharp cutting edge may damage pins, terminals, or the component itself.

This innovation is a hot-knife technique to remove the potting compound from the desired area without using a sharp cutting edge and without depolymerizing the surrounding compound. The figure shows three configurations that have been used for this purpose; however, the actual configuration will be dictated by the area from which the potting compound is to be removed.

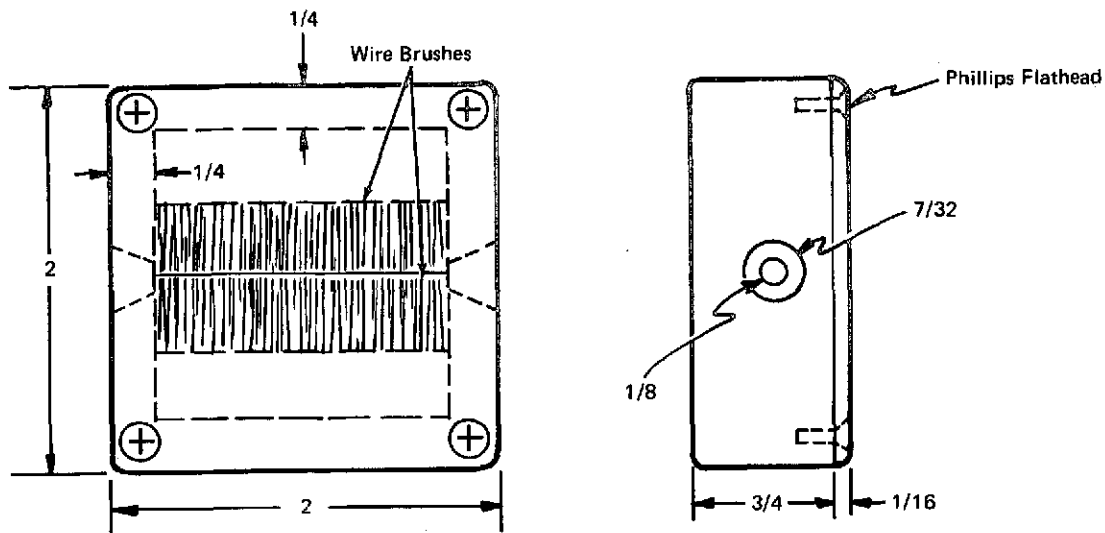
The tool consists of a loop of music wire, formed in the shape of the cross section of the compound to

be removed. The loop is attached to the tip of a standard 75-watt soldering gun by means of high temperature silver solder. The wire loop is made sufficiently rigid to pass through the compound under moderate pressure without deforming. Wire loop temperature must be high enough, 480 to 490 K (400° to 425° F), for the loop to enter the compound freely, but must not be high enough to cause depolymerization of the surrounding compound.

Source: J. T. Morris of  
IBM Corp.  
under contract to  
Marshall Space Flight Center  
(MFS-21368)

Circle 8 on Reader Service Card.

## TELEPHONE-SPLICE CLEANUP TOOL



Note: All dimensions in inches.

Telephone-Splice Wire Scrubber

Cross-talk and garbling of voice and data link signals can reduce communications operation to an unacceptable level. A major contributor to this condition has been corrosion on spliced joints that creates nonlinear junctions. Some instances of corrosion are sufficient to cause a diode effect that essentially blocks current flow in one direction. In one situation, a 400-lead cable was involved, and it was desired to remove the corrosion without resorting to cutting out a section and splicing in a new one.

A hand-held wire scrubber (see figure) was developed which can be used to efficiently clean the surfaces of telephone wire splices. The body of the unit was made of aluminum stock (60-61T6) into which a chamber was machined. Two wire brushes, #15 stainless steel, were fitted into the chamber, brush to brush, so that the line between the butted brushes when extended would coincide with two openings provided, one each in opposite sides of the

unit. The openings permit insertion of exposed metal of the telephone wire so that manual operation of the scrubber cleans off any foreign material or corrosion.

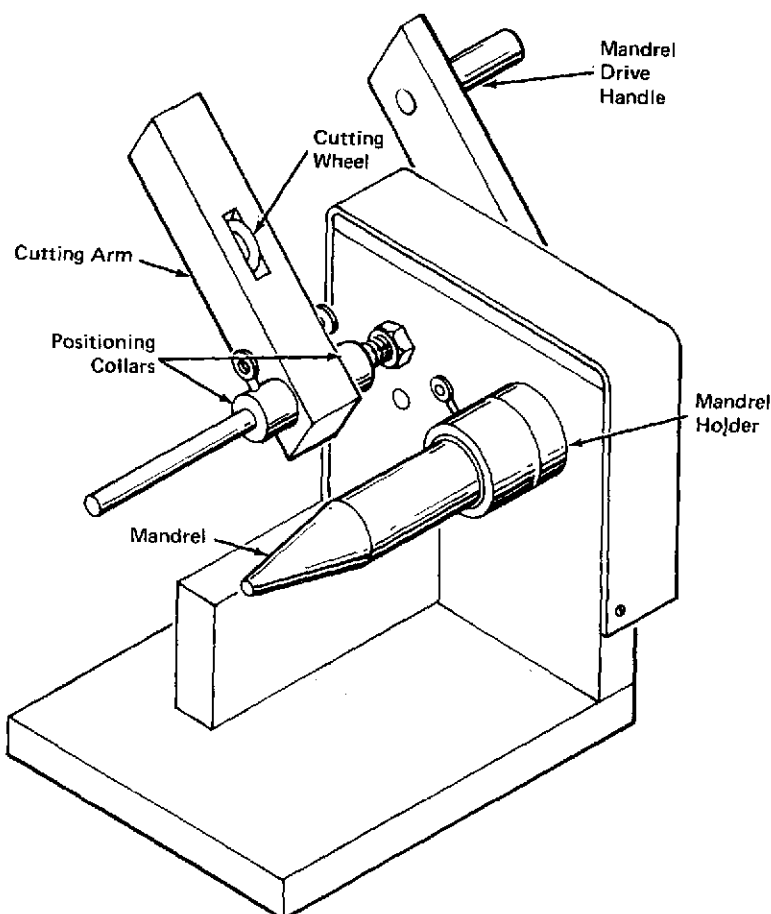
The wooden handles were cut from two brushes; a portion was trimmed from each brush surface to obtain more rigidity for the scrubbing function. Particles cleaned from wire splices and lodged in the unit can be removed simply by opening the cover and blowing out.

This small wire scrubber is inexpensive, easy to use, and is easily carried in a tool box or pocket (it has no sharp edges).

Source: J. A. Foster  
Kennedy Space Center  
(KSC-10679)

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## CABLE CONNECTOR BOOT CUTTER



Cable Connector Boot Cutter

Nylon boots are used in the fabrication of telemetry and control cables to retain the polyurethane potting compound while forming cable terminations. In one facility, boots of eight different internal diameters, and in many different lengths, are required. A store of nylon boot stock is maintained for each diameter connector to be potted. Boots are individually cut from this stock to the proper length for each potting operation. Previously each boot was cut with a sharp knife and one end was sanded to ensure a smooth straight edge. This process required an average of ten minutes per boot.

The figure shows the construction of a mechanical boot cutter, which can properly cut one boot per minute. The cutter employs removable mandrels in sizes to accommodate the various sizes of boots required. With the mandrel in place, the appropriate

boot stock is slipped over it, up to and over the mandrel holder, and the cutting arm is positioned on its shaft so the cutting wheel will cut the proper length of nylon material. The cutting arm is lowered so the cutting wheel engages the boot stock. The mandrel drive handle is rotated, driving the mandrel through a 2:1 reduction gear drive. A light downward pressure is maintained on the cutting arm, forcing the cutting wheel through the rotating nylon stock.

Source: N. D. MacLarty and W. R. Youngerman of Bendix Corp. under contract to Kennedy Space Center (KSC-10362)

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## PLANISHING TOOL FOR WIRE WELDS

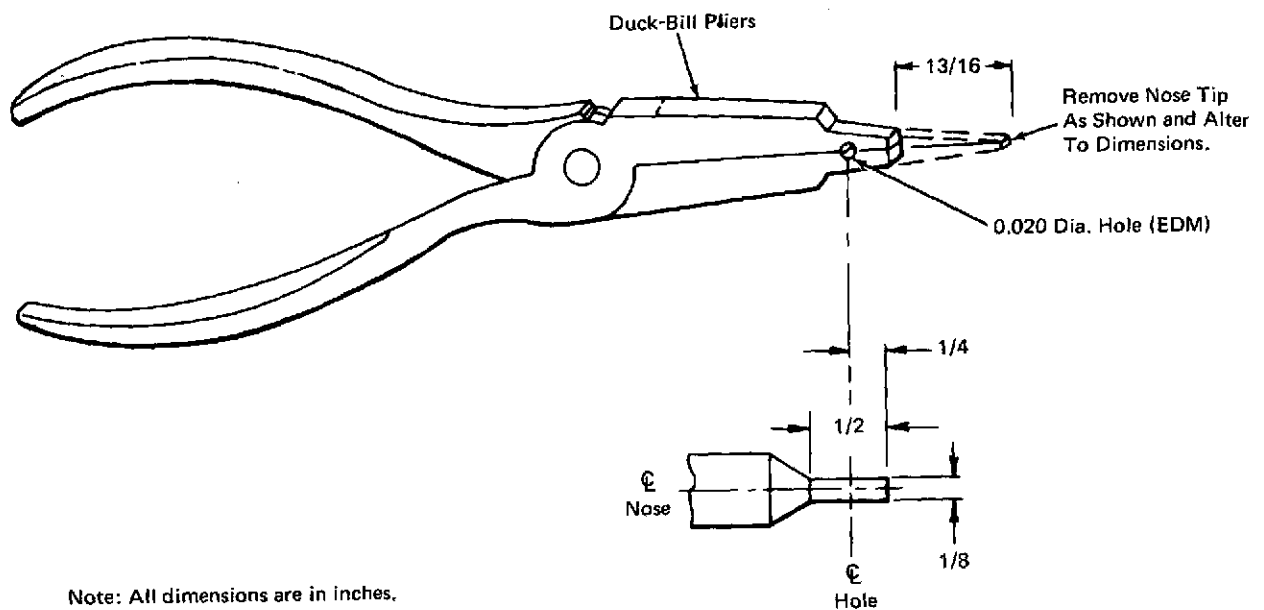


Figure 1. Weld Planishing Tool

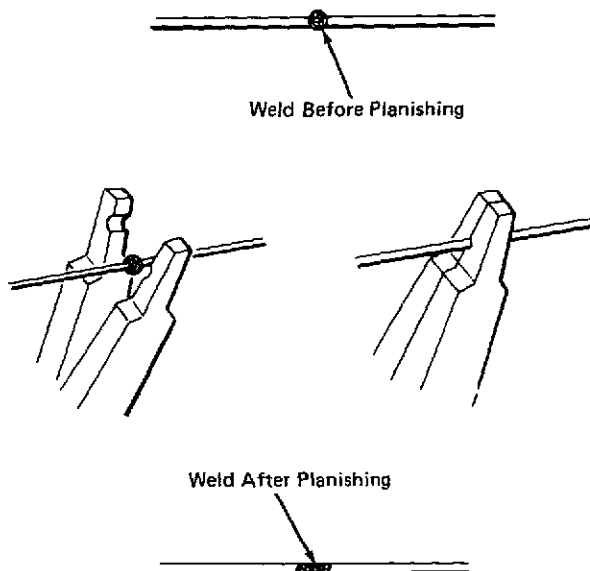


Figure 2. Use of the Weld Planishing Tool

A pair of duck-bill pliers can be modified into a tool which reduces the diameter of a weld joining two wires. Planishing the joint improves the electrical characteristics and permits insulation to be easily slipped onto the wire.

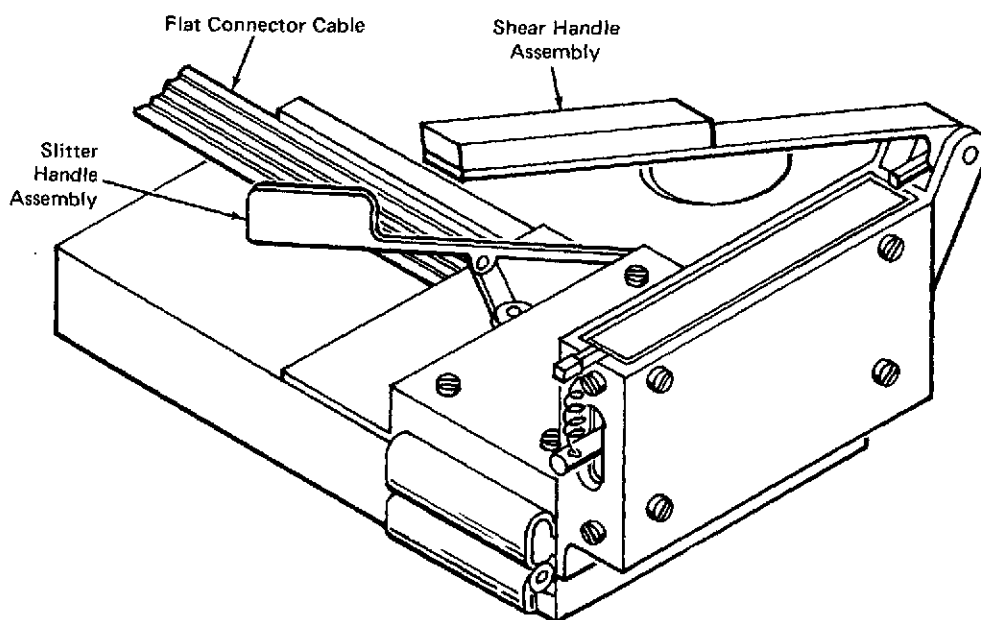
The tool consists of duck-bill pliers with some of the nose material removed. A hole is drilled in the nose of the pliers with the hole size determined by the diameter of the wire to be planished. The weld is inserted into the hole and the pliers are squeezed. The resulting joint is smooth and uniform. Figure 1 shows the dimensions for the tool and Figure 2 illustrates its use.

Source: M. A. Vanasse and G. C. Larson of Rockwell International Corp. under contract to Johnson Space Center (MSC-17435)

*No further documentation is available.*



### SPECIAL SHEAR FOR FLAT CONDUCTOR CABLE (FCC) APPLICATIONS: A CONCEPT



Shear/Slitter Combination Tool

This proposed shear/slitter is a manually operated tool used to obtain accurate 90° cuts of flat conductor cable (FCC). It will also make straight line slits between conductors. The new design provides adjustments for the shearing blades to eliminate any underslack when shearing FCC for a true 90° square cut, and has adjustments for the slitter blades to obtain the accurate straight cuts between

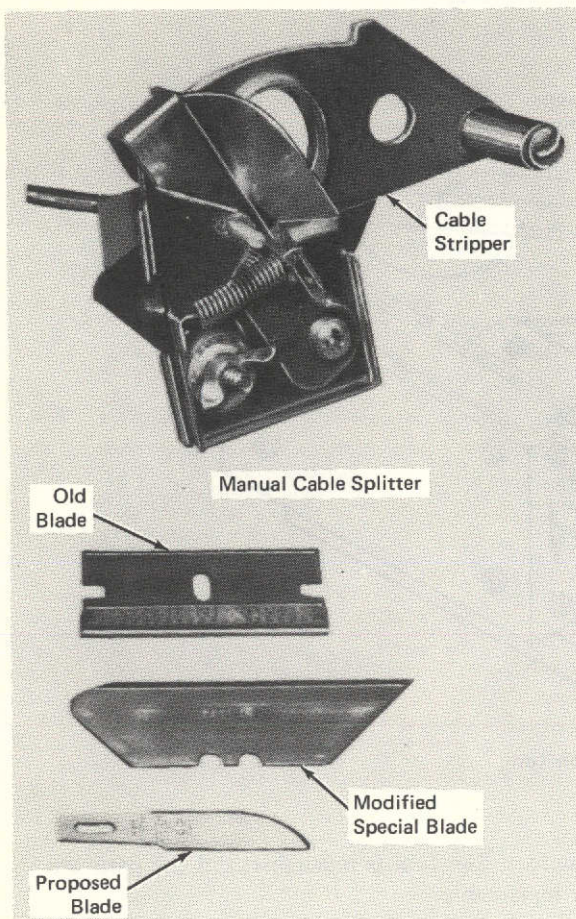
conductors. The tool is repairable, and the parts are easily replaceable.

Source: E. J. Stringer and J. D. Doyle of  
Rockwell International Corp.  
under contract to  
Marshall Space Flight Center  
(MFS-24151)

*Circle 11 on Reader Service Card.*

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## HAND-HELD CABLE STRIPPER IMPROVED WITH SPECIAL BLADE



A modified special blade (see figure) is used in a manual cable stripper to reduce hazard to the operator, to improve the cutting, and to increase blade life. The standard stripper uses a conventional single edge razor blade. Adjusting the blade for various depths of cut poses a hazard to the operator since he must grip the sharp blade end as he makes the adjustment.

The modified special blade shown in the photograph is ground to have a blunt end which projects from the cutter. This blunt end is gripped by the operator in making a depth-of-cut adjustments. This reduces the possibility of finger cuts present when adjusting the single edge razor blade.

A further concept has been proposed to provide a simple threaded adjustment for a more positive, cutter depth adjustment. This concept would employ a standard blade obtainable in art supply stores. A threaded adjustment rod would be placed between the slotted end of the blade and the cutter body to achieve more precise setting of the cutter depth.

Source: W. U. Falco of  
Rockwell International Corp.  
under contract to  
Johnson Space Center  
(MSC-15777)

*No further documentation is available.*

## Patent Information

The following innovation, described in this Compilation, is being considered for patent action as indicated below:

**Adjustable Force Probe (Page 15) MFS-20760**

This invention has been patented by NASA (U.S. Patent No. 3,693,418). Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to:

Patent Counsel  
Marshall Space Flight Center  
Code A&PS-PAT  
Marshall Space Flight Center, Alabama 35812

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